Waste and Water Management in Croatia

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GLOSSARY OF ABBREVIATIONS

CARDS	Community Assistance for Reconstruction, Development and Stabilization
CBS	Central Bureau of Statistics
CEA	Croatian Environment Agency
CFCA	Central Finance and Contracting Agency for EU Programmes and Projects
CW	Croatian Waters
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEA	European Environment Agency
EIRR	Economic internal rate of return
EPEEF	The Environmental Protection And Energy Efficiency Fund
EPOP	Environmental Protection Operational Programme
EU	European Union
EUROSTAT	Statistical Office of the European Communities
IPA	Instrument for Pre-Accession Assistance
MAFWM	Ministry of Agriculture, Forestry and Water Management
MEPPPC	Ministry of Environmental Protection, Physical Planning and Construction
NES	National Environmental Strategy
NWMS	National Water Management Strategy
NEAP	National Environmental Action Plan
OG	Official Gazette
OP	Operational Programme
PA	Priority axes
PEP	Pre-accession Economic Programme
REReP	Regional Environmental Reconstruction Programme
RWMC	Regional Waste Management Centre
SDF	Strategic Development Framework for 2006-2013
WFD	Water Framework Directive
WMC	Waste Management Centre
WMS	Waste Management Strategy
WWTP	Waste Water Treatment plant

1. Croatia's Overview

Croatia is a Central Eastern European country of 4.2 million inhabitants. Its major cities are Zagreb, Split, Rijeka and Osijek. The country has borders with Slovenia and Hungary to the North, Bosnia and Herzegovina to the Southeast, Serbia and Montenegro to the East. It was part of the Socialist Federal Republic of Yugoslavia until 1991, when the country became independent and adopted a parliamentary democracy. Croatia has significant natural endowments and a long business tradition in a wide range of sectors.

Since that time, Croatia has enjoyed a decent growth with a sustained increasing GDP of 4% to 5% per year until the Great recession and stable macroeconomic factors like low inflation rate and a low Croatian kuna/euro rate (7.58)-Croatian kuna/USD rate (6.82). However, the Great recession left severe consequences on Croatian economy. As a result of the Global economic recession, the GDP decreased in 2009 to (-6%). For the year 2015 it is expected for GDP to be positive around 1 %. Furthermore the unemployment rate increased and many sectors are affected by this global turndown. In spite of this situation, the inflation remains stable and under control with a level lower than 3 % (estimated for 2015: 1.3%). To conclude, the country still has some challenges to face in the future, including high unemployment, heavy dependence on hospitality and tourism, a growing trade deficit and growing external debt.

Croatia became a full member of the European Union on the 1st of July 2013. Croatia is also a member of the Council of Europe, NATO, United Nations and the World Trade Organization (WTO).

2. Economic Indicators

Economic Index	
Population	4,246,700[1]
Human Development Index (IDH)	0.812 [2]
GDP growth rate in 2014	-0,4%
GDP **GDP (per capita)**	€43.045 billion € 10,114 [3]
GDP (Composition by sector) - **Agriculture** - **Industry** - **Services**	 5% 29% 69,2%[4]
Inflation Rate	-0,2 % [5]
Average Monthly Salary (gross) **Average Monthly Salary (NET)**	€ 1056 € 748[6]
Unemployment Rate	17,1% [7]
Export per capita, EUR	3,383
Import per capita, EUR	2,253[8]
Global Competitiveness Index	4.1[9]
Gross external debt, mln EUR, midpoint exchange rate	46.664[10]
Main Commercial Partners	Italy Bosnia and Herzegovina Germany Slovenia Austria[11]
Currency	kuna (HRK)
Average Exchange Rate/Euro **Average Exchange Rate/Dollar**	7.586425 HRK 6.827236 HRK[12]

Table 1: Croatia's Economic Indicators

[1] http://www.dzs.hr/Hrv_Eng/publication/2012/SI-1469.pdf
[2] http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/HRV.pdf
[3] http://www.hnb.hr/statistika/h_ekonomski_indikatori.pdf
[4] http://www.indexmundi.com/croatia/gdp_composition_by_sector.html
[5] http://www.hnb.hr/statistika/h_ekonomski_indikatori.pdf
[6] http://www.dzs.hr/Hrv/system/first_results.htm
[7] http://www.hnb.hr/statistika/h_ekonomski_indikatori.pdf
[8] http://www.dzs.hr/Hrv_Eng/CroInFig/croinfig_2014.pdf
[9] http://reports.weforum.org/global-competitiveness-report-2014-2015/economies/#economy=HRV
[10] http://www.hnb.hr/statistika/h_ekonomski_indikatori.pdf
[11] http://europa.eu/about-eu/countries/member-countries/croatia/index_en.htm
[12] http://www.hnb.hr/tecajn/htecajn.htm

3. Introduction

3.1 Croatia and the environment

The natural environment is one of the most important assets in Croatia's economy; it is one of the main drivers of economic development, given its essential role in the tourism of Croatia. The country has a well-preserved environment mainly due to the absence of heavy industrial pollution over recent years; it is distinguished by a great biological and geographical diversity and has relatively abundant fresh water supplies. However, the level of environmental protection is generally lower than in the EU.

From the 1990's, Croatia has been slowly but surely progressing, which is partly the result of its highly attractive environment and the generation of tourism revenue, but it also reflects the increased private consumption and investment. Paradoxically, this places increasing demands on Croatia's environmental infrastructure, presenting a set of challenges that need to be managed efficiently and effectively. In particular, there is an increasing demand for high quality and reliable environmental services: water supply and the disposal of waste water, the management of solid waste, retaining a clean air environment and preserving the natural habitat. The ongoing fiscal consolidation and planned policy measures to reduce public debt mean that public resources for investment in modernizing and maintaining infrastructure must be carefully managed to maximize effective spending and value for money. This emphasizes the importance of well-founded environmental strategies, the prioritization and sequencing of infrastructure projects, and maximizing the contribution of funding sources.

Sustainable development offers to each country and at a global level, a positive long-term vision of a society that is more prosperous and more just, and which promises a cleaner, safer, healthier environment - a society which delivers a better quality of life for us, our children and future generations. Achieving this in practice requires that economic growth supports social progress and respects the environment. Environmental protection requirements must be integrated into all relevant sectorial policy areas (transport, energy, agriculture, tourism, etc.). This means that environmental protection should be an integral part of transport infrastructure development, as well as of energy, agriculture, and industrial development.

Besides the preservation of the biological and geographical diversity, the Adriatic seacoast and islands and the corresponding municipal infrastructure, such as water supply, sewage and waste water treatment infrastructure and waste infrastructure, are preconditions for the long term development of tourism and overall development. The key facet of environmental protection is environmental management which is, in-turn, multi-faceted, covering a wide range of complex and interlinked sectors and activities – water and waste management, air pollution, natural habitat/nature protection, biodiversity, noise, industrial pollution, and chemicals. Sustainable development is therefore integral to Croatia's environmental policy and strategy framework. In the introduction to the National Environmental Strategy it is stated that the concept of sustainable development should become a predominant determinant of the development strategy of the Republic of Croatia which will enable to the future of environmental protection to be seen in a different way and in a much wider context than earlier.

The Report of the State of the Environment (http://www.azo.hr/Izvjesca29) gives a deeper insight on the current situation in waste and water management in Croatia. The problem is that Croatia still does

not have an efficient way of reusing the waste and therefore loses a lot in economic sense. The situation with the water is not much better. There is a significant loss of water in the public sector supply.

3.2 Croatian Environmental Strategy Framework

Croatia became a party to the UN Framework Convention on Climate Change (UNFCCC) in 1996. As a country with economy in transition it enveloped the responsibilities under Annex I of the Convention. The Republic of Croatia signed the Kyoto Protocol in 1999. After its ratification by the Croatian Parliament the Republic of Croatia reduced the greenhouse gas emissions by 5% in the first commitment period between 2008 and 2012 in relation to the base year. In the "Post – Kyoto" period gas emissions should be reduced by 20 %.

In 2009 Croatia faced complications at the Copenhagen Climate change Conference due to the adoption of the National Energy Strategy that leads Croatia into more dependence on fossil fuels and increase of green-house emissions. Another event that may affected Croatia is that, after the UN Committee for implementation of Kyoto Protocols dismissed the First Initial Report on Croatia's implementation of the Protocol, having in mind that Croatia artificially added 3.5 million tons of emissions to the real emissions of 1990, the base year in the UN Framework Convention on Climate Change, it was later approved by the Convention Assembly of 2006.

Furthermore, Croatia demanded to be allowed 6% increase of emissions through year 2020, compared to the minimum of 20% reduction in most other states, due to the new Energy Strategy, which includes plans to build two new coal-fuelled power plants, with the possibility to build a nuclear power station (2020 at the earliest) and re-launch the Adria pipeline project.

The First Croatian National Communication under the UN Framework Convention on Climate Change was submitted to the Convention Secretariat in 2002. (http://unfccc.int/resource/docs/natc/hrvnc4.pdf)

Agreements signed by Croatia can be found in the web site of the Ministry of Environmental and Nature Protection: http://www.mzoip.hr/hr/propisi-i-medunarodni-ugovorixxx.html. This web site mentions all the International treaties ratified or signed by the Republic of Croatia.

Croatia's basic development orientations have been defined in socio-economic development documents and sector strategies and plans. The sector strategies relevant to the environment sector are:

- National Environmental Strategy (2002);
- Physical Planning Strategy of the Republic of Croatia (1997, updated in 2013);
- Transport Development Strategy of the Republic of Croatia (1999, updated in 2011);
- Energy Development Strategy of the Republic of Croatia (2002, updated in 2009);
- Agriculture and Fishery Strategy (2002);
- Croatian Tourism Development Strategy for the Period up to 2020 (2013) ;
- Industrial Strategy 2014-2020 (2014)

Documents that determine the national environmental policy framework in Croatia are:

- Strategy Government Programmes 2013-2015
- The National Environmental Strategy (NES) and National Environmental Action Plan (NEAP)
- NES is subsequently supported by sub-sector strategies, such as the National Waste Management Strategy and the draft National Water Management Strategy
- Strategy of Sustainable Development of the Republic of Croatia
- Waste Management Plan 2007-2015
- Water Management Plan (yearly updated)

The **Strategy of Government Programmes 2013-2015** defines priorities and goals of the Government of the Republic of Croatia with sustainability and environmental protection being part of it.

The **National Environmental Strategy**[13]is the key document for the environment sector; it demonstrates that environmental pressures come from all economic sectors. However sectors of particular importance are transport (user structure, infrastructure construction, and fuel quality), energy (emissions, transfer, waste and use of fossil fuels), industry (emissions and wastewaters), tourism and partly agriculture (use of artificial fertilizers, pesticides). The environment and its loads and pressures not only affect the quality of life for residents, but equally also the attractiveness of Croatia as a tourist destination and its international perception as a country with a preserved environment and producing healthy food. Therefore, it is of wide importance that timely and effective solutions to the problems in the environment sector are found; improving the environmental infrastructure can solve the primary problems of waste management and water resources.

The NES has the following national long-term environmental objectives:

- Conservation and improvement of water, sea, air and soil quality;
- Conservation of the current state of biological diversity;
- Preservation of natural resources, particularly the integrity and features of special natural assets (sea, coast and islands, mountain areas, etc.).

The main national strategic documents for the waste and water management sectors are the Waste Management Strategy (OG No. 130/2005) and the Water Management Strategy (OG. No 91/08). The Waste Management Strategy was adopted in October 2005 and establishes the framework for waste reduction and sustainable waste management. The Water Management Strategy was adopted in July of 2008 and provides the strategic framework for the sustainable use of water resources in the country.

The **National Environmental Action Plan** is directly attached to NES. This plan covers objectives, measures to achieve objectives, the level of actions, authorized implementing bodies, time schedules and possible sources of finance.

[13] Adopted by the Croatian Parliament on 25 January 2002 (Official Gazette of 25 April 2002 No 46/2002)

The **Strategy of Sustainable Development of the Republic of Croatia** encompasses all three dimensions of sustainable development: environmental, social and economic. The strategy focuses on obtaining results in these eight key areas:

- Encouraging population growth in Croatia
- Environment and natural resources
- Promoting sustainable production and consumption
- Ensuring social and territorial cohesion and justice
- Ensuring energy independence and increasing the efficiency of energy use
- Strengthening public health
- Interconnectedness of the Republic of Croatia
- Protection of the Adriatic Sea, coastal area and islands

These eight points serve as the basis for strategic directions of Republic of Croatia.

The **National Waste Management Strategy** (2005)[14] assesses the situation, identifies the problems and obstacles and sets the main waste management objectives for the period 2005-2025; these goals include:

- Development of an integrated waste management system;
- Establishment of county and regional waste management centres
- Remediation and closure of existing landfills
- Remediation of sites highly polluted by waste – hot spots; and
- Improved information and reporting systems for the waste management system.

The Waste Management Strategy regulates the management of different types of waste on the territory of the Republic of Croatia, from its generation to final disposal, with the basic aim of achieving and maintaining an integrated waste management system, which will be organized in line with contemporary European requirements and standards. The purpose of an integrated waste management system is to avoid to the maximum extent, (i.e., reduce) the generation of waste, to minimize the adverse impacts of waste on the environment, climate and human health, and to harmonize the entire waste management system with the principles of sustainable development.

The Waste Management Strategy will be implemented through a **National Waste Management Implementation Plan,**[15] which was adopted on 19th July 2007 by the Government of the Republic of Croatia and will be valid for a period of 8 years. The period ends in 2015 but unfortunately there are no data on upcoming plans.

The relevant county waste management plans, which have been developed or are in the development stage, will elaborate, in accordance with the National Plan, the individual project details and how they fit into the county / regional integrated waste management system.

The **National Water Management Strategy** is the basis upon which water management reforms are being implemented in order to equalize with EU standards.

[14] Adopted by the Croatian Parliament on 14 October 2005 (Official Gazette of 2 November, No 130/2005)
[15] Official Gazette of 16 August 2007, No 85/2007

Water management plan is a document adopted once a year on water managing. It has to comply with the financial plan of Croatian Waters and with the Water Areas Management Plan.

3.3 Institutional framework

On a general level, responsibility for environmental policy lies mainly within the following three ministries:

The **Ministry of Environmental and Nature Protection** (www.mzoip.hr)

The **Ministry of Agriculture** (http://www.mps.hr/default.aspx?id=5340)

The **Ministry of Regional development and EU funds** (www.mrrfeu.hr)

Other government bodies concerned with environmental protection are: Ministry of Social Politics and Youth (http://www.mspm.hr/), Ministry of Health (http://www.zdravlje.hr/en/ministry), Ministry of Science, Education and Sport (http://public.mzos.hr/Default.aspx), Ministry of Culture (http://www.min-kulture.hr/default.aspx?id=4616), Ministry of Economy (http://www.mingo.hr/en), Ministry of Regional Development and EU Funds (https://razvoj.gov.hr/), Ministry of Entrepreneurship and Crafts (http://www.minpo.hr/default.aspx?id=68), Ministry of Tourism (http://www.mint.hr/default.aspx?id=4493) and Ministry of Sea, Transportation and Infrastructure (http://www.mppi.hr/default.aspx?id=7397).

In addition, the Croatian Agency for the Protection of Environment and Nature (merger of Agency for Environment Protection http://www.azo.hr/English and State Institute for Nature Protection http://www.dzzp.hr/eng/) has the task of gathering and providing environmental data. Last but not least, there are the Environmental Protection and Energy Efficiency Fund and the Croatian Waters for water management.

Moreover, the Association of Municipal Waste Management at the Croatian Chamber of Economy gathers all the companies within the same domain and implements activities like seminars, education, determine remarks and suggestions related to legal framework, organizing fairs and similar events.

(http://www.hgk.hr/category/udruzenja/udruzenje-komunalnog-gospodarstva).

WASTE MANAGEMENT IN CROATIA

4. Waste Overview

Waste is an unavoidable by-product of most human activity. Economic development and rising living standards have led to increase the quantity and complexity of generated waste.

A clear estimation of the quantities and characteristics of the generated waste is a key component in the development of robust and cost-effective waste management.

Waste is divided according to its attributes and according to the place of origin. Classification by attributes envelopes: hazardous waste, non-hazardous waste and inert waste. According to the place of origin the waste is divided into: municipal solid waste, industrial waste, biomedical waste, agriculture waste, mining waste and special categories of waste.

Hazardous waste: With rapid development in agriculture, industry, commerce, hospital and health-care facilities are consuming significant quantities of toxic chemicals and producing a large amount of hazardous waste. Currently, about 110,000 types of chemicals are commercially available. Each year, another 1,000 new chemicals are added to the market for industrial and other uses. Hazardous waste contains elements with attributes that are explosive, radioactive, harmful, toxic, cancerogenic, reactive, corrosive, contains teratogen, ecotoxic and elements that have the property of emitting toxic gases as a result from chemical reactions or biodegradation.

Non-hazardous waste is waste that by its properties does not affect human health and environment in any aspect.

Inert waste is a type of waste that either does not contain or contains a small amount of elements that have the property of physical, chemical and biological degradation. This type of waste is not harmful to the environment.

Municipal Waste: Municipal solid waste (MSW) is generated from households, offices, schools and other institutions. The major components are food waste, paper, plastic, and rags, metal and glass, although demolition and construction debris is often included in collected waste, such as electric light bulbs, batteries, automotive parts and discarded medicines and chemicals. Sources and types of solid wastes:

Source	Typical waste generators	Types of solid wastes
Residential	Single and multifamily	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g. bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes
Institutional	Schools, hospitals, prisons, government centres	Same as commercial

Construction and Demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, etc.
Municipal Services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings, landscape and tree trimmings, general wastes from parks, beaches, and other recreational area, sludge
Process	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing	Industrial process wastes, scrap materials, off specification products, slag, tailings
All of the above should be included as "municipal solid waste."		
Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms	Spoiled food wastes, agricultural wastes, hazardous wastes (e.g. pesticides)

Table 2: Sources and types of solid Wastes

Industrial solid waste encompasses a wide range of materials of varying environmental toxicity. Typically this range would include paper, packing materials, waste from food processing, oils, solvents, resins, paints and sludge, glass, ceramics, stones, metals, plastics, rubber, leather, wood, cloth straw, abrasives, etc. Regulations related to industrial waste:
Ordinance on packaging and packaging waste
(OG No. 97/05, 115/05, 81/08, 31/09, 156/09, 38/10, 10/11, 81/11, 126/11, 38/13, 86/13)
Decision on requirements regarding packaging labelling (OG No. 155/05, 24/06, 28/06)
Ordinance on waste tyre management
(OG No. 40/06, 31/09, 156/09, 111/11, 86/13)
Ordinance on waste oil management
(OG No. 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13)

Biomedical waste includes infectious waste from hospitals and waste from medical and laboratory origin. Ordinance on medical waste management (OG No. 50/15).

Agricultural Waste and Residues: Expanding agricultural production has naturally resulted in increased quantities of livestock waste, agricultural crop residues and agro-industrial by-products. Ordinance on management of wastewater treatment sludge when used in agriculture (OG No. 38/08).

Construction waste is the waste that originates from constructing buildings, reconstructing, and removing and maintaining of existing buildings. Ordinance on the method and procedures for managing waste containing asbestos (OG No. 42/07).

Mining waste is the waste from extraction and processing of mineral resources. Ordinance on managing waste from research and mining of mineral raw materials (OG No. 128/08)

Special categories of waste encompass radioactive and explosive waste.

Waste management responsibilities in Croatia are divided between the following institutions:

The Croatian parliament and **the Government of the Republic of Croatia** are State Authority Bodies. The Parliament adopts the relevant legislation and national strategies, such as the Waste Management Strategy.

A Parliamentary committee issues opinions on specific acts and documents. The Government adopts the waste management plan and its implementing legislation (Regulations), proposes relevant legislation and strategies to Parliament and defines mandatory locations. The Government ensures the conditions and prescribes the measures for hazardous waste management and for the incineration of waste.

The **Ministry of Environmental and Nature Protection (www.mzoip.hr)** is a State Administration Body (ministries, State Administration offices in the counties). In the waste sector, it is responsible for:

- Preparing new primary legislation and standards;
- Preparing the National Waste Management Strategy and National Waste Management Implementation Plan;
- Preparing implementing legislation;
- Approving reports on the state of the environment and the environmental protection programs;
- Approving activities(interventions) based on environmental impact assessments;
- Issuing permits for hazardous waste management and the incineration of waste; and concessions for specific waste category management (used tyres, packaging waste, waste oils etc.);
- Hazardous waste management (implementation of measures);
- Inspection and supervision and enforcement of laws and secondary legislation;
- Monitoring the Croatian Environment Agency and Environmental Protection and Energy Efficiency Fund.

The **Environmental Protection and Energy Efficiency Fund (EPEEF, http://fzoeu.hr/en/)** , established in 2003 and operating since the beginning of 2004, is an extra-budgetary institution owned by the Republic of Croatia, the purpose of which is to finance environmental protection programmes and projects.

This also includes energy efficiency and use of renewable energy sources. The EPEEF collects different environmental charges as its own revenue, which includes charges for burdening the environment with hazardous and non-hazardous industrial waste.

The **Croatian Environment Agency (CEA, http://www.azo.hr/Default.aspx?sec=275)** is a public institution established by the Government in 2002. The CEA primarily collects processes and provides data required for the efficient implementation of the environmental protection policy. It performs tasks related to development and coordination of the environmental protection information system. It prepares the report on the state of the environment (reports on waste and water management are a component of that report), which is endorsed by the MEPPPC. Furthermore, the CEA is responsible to provide reliable and comparable waste data and information to decision-makers and general public.

The Croatian Environmental Agency:

- Collects data according to Waste Act and sub-laws
- Maintains the waste information system
- Prepares indicators on waste
- Prepares the reports on waste and waste management
- Improves quality, quantity, availability and comparability of waste data
- Enables access to waste information on the CEA web pages

The **Counties and the City of Zagreb** are regional self-government units, which are responsible for managing all types of waste in their respective areas, issuing waste management plans for their respective areas; gathering and submitting data on waste (cadastre of emissions into the environment, etc.); the **state administration offices in the counties** issue permits for non-hazardous waste management.

Towns and municipalities are local self-government units that are responsible for managing municipal waste, preparing waste management plans and determining locations in spatial plans for their respective areas.

The Public Utility Services Act sets down that public utility services (which encompass municipal waste management) can be performed by:

- Public utility companies established by local self-government units (local self-government units should own at least 51% of the company);
- Public institutions established by local self-government units;
- Organizational unit of local self-government units;
- Legal and natural persons on the basis of a concession agreement;
- Legal and natural persons on the basis of a contractual agreement.

Stakeholders involved in waste management are companies registered and licensed for the collection and transport, recovery and/or disposal of waste, or for the management of special categories of waste, consulting firms, professional and non-governmental organizations.

4.1 Waste Management in Croatia

In Croatia, waste management is currently one of the largest challenges in the environmental sector and certainly one of the most demanding areas in terms of adjustment to the standards of the European Union (EU). Solving these issues and orientation toward integral and modern waste management are one the requirements for EU entry. The issues that the country needs to address are: increase in solid waste, limited recycling programs, unreliable data concerning flows and quantities and lack of organized disposal sites and management issues.

The Ministry of Environmental and Natural Protection (http://www.mzoip.hr/en/)is the State Administration Body. In the waste sector, it is responsible for:

The country is expecting that in 2025 almost entire population will be included in the organized collection of a municipal waste system, recycled and treated waste will grow significantly, and a important reduction of disposed municipal and biodegradable waste will be achieved.

Currently municipal waste management in Croatia is undergoing a radical transformation from decentralized disposal of non-treated waste on numerous local sub-standard landfills within counties to centralized waste management and Waste Management Centres (WMC) serving the needs of one county or, in some cases, of several counties. The WMC concept has been adopted by the Croatian Government in its National Waste Management Plan.

For the establishment of a waste management system, the RC **Waste Management Strategy (NN 130/05,** http://www.mzopu.hr/doc/Waste_Management_Strategy_OG%20130-205.pdf**)** and the Republic of Croatia **Waste Management Plan for the period from 2007-2015 NN 85/07,** http://www.mzopu.hr/doc/WASTE%20MANAGEMENT%20PLAN%20OG%2085-207.pdf**)** envision the construction of regional and country waste management centres.

The main objective of the Strategy is to establish a framework within which Croatia will be obliged to reduce the quantity of waste it currently generates, and to manage its waste in a sustainable manner.

By 2018 some of the 13 WMCs are suppose to open. 70 % of the WMCs will be financed from the EU funds. The counties and the City of Zagreb created waste management plans in which they defined waste management system in such a way that one waste management centre (WMC) is planned per county or in the City of Zagreb. Two concepts were proposed for a system of managing non-hazardous (municipal and production) waste: the so-called 'county concept' (one WMC in each county) and the so-called 'regional concept' (eight regional and five county WMCs). Competent authorities announced that the building of WMCs won't start before receiving incentives from the EU[16].

4.2 Croatia's Waste Statistics and Waste Management Practices

4.2.1 Statistics

a) Waste management

Data related to waste sector rely on several sources: the Croatian Environment Agency – CEA (derived from Environmental Emission Register), Croatian expert institutions and firms, the Environmental Protection and Energy Efficiency Fund (http://www.fzoeu.hr/en/home/)and Ministry of construction physical planning (www.mgipu.hr). The data presented for waste management is approximated because only a few cities/municipalities provide data on actually measured (weighted) quantities of waste. The quantification of municipal waste is primarily done by means of visual assessment. The data collection system in Croatia has to be improved in accordance with the already developed legal basis. This is one of the goals set in the National Environmental Strategy and National Waste Management Strategy 2007-2015.

Croatia still lacks of an effective waste management system. Waste export practices imply high costs for the country, which could be reduced by having the correct infrastructure and technology. Croatia moves towards more effective and more efficient waste management system. It already started to implement strong waste management systems whose results will be noticed in the forthcoming years.

Another factor concerning the inefficient implementation of an effective waste management plan is that data are not updated regularly. There are data found in some sources, but in some cases it is not enough to have a broad view and perform a deeper analysis.

[16]Construction waste is the waste that originates from constructing buildings, reconstructing, and removing and maintaining of existing buildings**.**

4.2.2 Waste Management Practices in Croatia

In Croatia, the most used waste practices are:

Recycling is the process of extracting resources or value from waste is generally referred to as recycling, meaning to recover or reuse the material. There many ways to recycle waste materials: the raw materials may be extracted and reprocessed, or the calorific content of the waste may be converted to electricity. This is widely used in Croatia, but there is still a need to upgrade the facilities and implement new technologies in order to increase the efficiency of this method, because the production of energy could be bigger and cleaner. Statistics say that 45 % of municipal waste can be reused/recycled and that is why Croatia should be even more involved in recycling.[17]
Here is the list of recycling yards where the separated waste can be brought http://www.azo.hr/ReciklaznaDvorista .

Physical Reprocessing refers to the widespread collection and reuse of everyday waste materials e.g. empty beverage containers. These are collected and sorted in common types, so that the raw materials from which the items are made can be reprocessed into new products.
Materials for recycling may be collected separately from general waste using designated waste bins and collection vehicles, or sorted directly from mixed waste streams.

The most common consumer products recycled include aluminium beverage cans, steel food and aerosol cans, HDPE and PET bottles, glass, and jars, paperboard cartons, newspapers, magazines, and cardboard. Other types of plastic (PVC, LDPE, PP and PS) are also recyclable, although these are commonly collected. These items are usually composed of a single type of materials, making them relatively easy to recycle into new products. The recycling of complex products (such as computers and electronic equipment) is more difficult, due to the additional dismantling and separation required.

Croatia still has a long way to increase the amount of recycled material. There are containers in order to recycle this kind of products but there are not used properly. Although there is no lack of this kind of bins, in general the population does not have yet the proper services in order to recycle the material after it is collected.

Composting: Waste materials that are organic in nature, such as plant material, food scraps, and paper products, can be recycled by using biological composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as much as possible or composted for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity.

Energy Recovery: The energy content of waste products can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel.

Incineration: Incineration is a disposal method that involves combustion of waste material. Incineration and other high temperature waste treatment systems are sometimes described as "thermal treatment". Incinerators convert waste materials into heat, gas, steam, and ash.

[17] https://www.pmf.unizg.hr/_download/repository/07_Odlagalista_otpada.pdf

Incineration is carried out both on a small scale by individuals and on a large scale by industry. It is used to dispose of solid, liquid and gaseous waste. It is recognized as a practical method of disposing of certain hazardous waste materials (such as biological medical waste). Incineration is a controversial method of waste disposal, due to issues such as emission of gaseous pollutants.

Landfill: Disposing of waste in a landfill involves burying the waste, and this remains a common practice in most countries. A properly-designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing of waste materials.
http://www.scribd.com/doc/10308295/Waste-Management

Another category of waste is bulky waste. It's regulations on the disposal are prescribed in the Law on sustainable waste management http://narodne-novine.nn.hr/clanci/sluzbeni/2013_07_94_2123.html .

Recent statistics on Waste in Croatia imply that in (2012), there was 1 670 005 tonnes of municipal waste (http://www.azo.hr/IzvjesceOKomunalnomOtpaduZa) and 63 615 tonnes of hazardous waste (2011).

Here are data about special waste categories:.

- Waste from old batteries and accumulators 7 165 t
- Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified 118 493 t
- Electronical waste 16 187 t
- Waste grease 5835 t
- Waste edible oils 911 t
- Waste tyres 18 305 t [18]

Croatia imported 304 327.76 tonnes of non-hazardous waste in 2011. Out of the total quantity of imported waste, Croatia imported the most from BIH (30.92) and Serbia (28.35). Paper, glass and carton were the most imported items.

Out of the total quantity of exported waste (21 049.48 t), 97.18% were exported to EU Member States and 2.82% to other countries. Out of the total quantity of exported waste, 29.28% consisted of battery plates. Except batteries the most exported was construction and demolition waste (including excavated soil from contaminated sites), solvents and various colouring agents.[19]

4.2.3 Hazardous waste management report

Market Demand

Taking care for hazardous waste is still in progress in Croatia. The organization of separate collection and technical capacities for the collection, storage and treatment of certain types of hazardous waste is already in progress.

[18] http://www.azo.hr/Letci
[19] file:///C:/Users/Oja/Downloads/Prekogranicni_%20promet_%20otpada_2011_%20(2).pdf

Aspects still to be completed for these projects include: organizing the network of collection points for hazardous waste; establishing a system of hazardous waste collection and transportation; establishing centres for hazardous waste management (recycling, treatment, disposal); erecting an incinerator; development of a special information system with databases and waste flows; and the development of a network of regional storage facilities for sorting and storing hazardous organic and inorganic waste.

Market Data

About 213,000 tons of hazardous waste is generated in Croatia per year. Currently, the Waste Cadastre is not yet able to ensure complete and integral data regarding the quantities, types and flows of the generated waste.

There are currently neither regulated sites for hazardous waste landfilling, nor adequate hazardous waste management facility for the hazardous waste collection. Therefore, hazardous waste requiring landfilling (waste which cannot be recycled, recovered, etc.) is exported. But there are also some hazardous waste landfills with inadequate protection. Most recent data on export of hazardous waste are from 2011. In 2011, a total of 17,878 tons of hazardous waste was exported. Battery plates and construction waste containing asbestos represented 40 % of exported hazardous waste.

A small portion of hazardous waste is treated and recovered using a variety of methods:

- thermal treatment
- conditioning by incorporation into brick products
- solvent regeneration
- neutralization of acids and bases
- solidification and stabilization
- sterilization/disinfection
- electrolysis and dilution

A significant contribution to the reduction of the pressure on the environment has been achieved through opening of new facilities/installations for recycling secondary raw materials (plastic, metal, tyres, glass etc.). Thermal treatment of individual waste types is carried out within determined industrial facilities and hospitals. Energy plants with power exceeding 3 MW are used for the co-incineration of hazardous waste, mainly waste oils and infectious waste. Waste tyres, waste oils, and meat are co-incinerated in cement factories. Specialized incineration plants within the premises of economic operators have some smaller capacity for the incineration of waste from their own activities. These incineration plants are used for their own needs but they have also begun to provide hazardous waste incineration services to other parties.

Documents and regulations relevant to hazardous waste management:

- Waste Management Strategy of the Republic of Croatia (OG 130/05)
- Waste Management Plan of the Republic of Croatia for the Period 2007-2015 (OG 85/07)
- Environmental Protection Act (OG 110/07)
- Waste Act (OG 111/06, 60/08)
- More than 30 implementing regulations about management of special waste categories adopted between 2005 and 2009.

Hazardous Waste Incinerator

The problem of hazardous waste incinerator in Croatia has been discussed approximately for the last 20 years. It is hard to achieve any kind of agreement because of the dissents of inhabitants of potential incinerator places and legal authorities.
The problem of hazardous waste in Croatia was solved by "wild" landfills or by export. The first one left severe consequences on the environment which is now really expensive to re-establish and it takes a lot of time. The second one is very expensive to perform.

Rehabilitation of "black spots"
In its operative plan "Okoliš", the Ministry of Environmental Protection recorded 9 "black spots" in Croatia. Unfortunately only two of them, "Lemić Brdo" and TEF are being remediated. Up to 85% of financing can be financed through European Funds, depending on the project

Expected projects:

- *Sovjak* site near Rijeka ($40 million)
- *TEF* site near Sibenik ($4 million)
- *Lemic brdo* site near Karlovac ($4 million)
- Landfill of oily sludges in Botovo
- Phosphogypsum landfill in Kutina
- Slag landfill in Kaštela Bay near Split
- Slag landfill of thermal power plant *TE Plomin I* in Istria

5. Major issues in Waste Management Practices in Croatia

Croatia entered the EU so it has to adjust to EU laws. It is hard to do that after many years of letting "wild landfills" to happen. Not only is the environment destroyed but it will take years for it to recover. Not to mention that at the end it costs a lot of time and money. Here are the major issues and problems in the waste management in Croatia are:

- Increased volumes of waste being sent to landfill;
- Limited waste separation at the point of generation, along with low recovery and treatment rates;
- Shortage of municipal waste recovery and treatment plants
- Underdeveloped information and reporting systems

6. Legal Framework

Croatian legislation related to waste and water sector:

- The Environmental Protection Act (OG No. 82/94 and 128/99);
- The Waste Act (OG No. 178/04 and 111/06);
- The Water Act (OG No. 107/95 and 150/05);
- The Water Management Financing Act (OG No. 107/95, 19/96, 88/98 and 150/05).

On 23rd of July 2013, Croatian Parliament declared the law on sustainable waste management (OG No. 94/13)

- Avoiding and reducing the generation of waste and reducing the hazardous properties of waste;
- Waste recovery (recycling, reuse or through some other procedure that allows separating the raw materials, or use of waste for energy purposes);
- Waste disposal in the prescribed manner; and
- Remediation of the environment where polluted by waste.

The relevant provisions of Council Directive 75/442/EEC on waste, as amended by the Council Directive 91/156/EEC, Commission Decision 94/3/EC, Commission Decision 96/350/EC and Commission Decision 2000/532/EC have been transposed into the Waste Act. This Act also sets out the general legal framework for further approximation with EU legislation in the waste sector, which includes some secondary legislation that has already been adopted:

- ✓ Regulation on types, categories and classification of waste with a waste catalogue and hazardous waste list (OG No. 50/05)
- ✓ Ordinance on packaging and packaging waste (OG No. 97/05 and 115/07),
- ✓ Decision on conditions for packages labelling (OG No. 155/05, 24/06 and 28/06)
- ✓ Ordinance on waste tyres management (OG No. 40/2006)
- ✓ Ordinance on register of legal and natural person performing activities of intermediation in organizing recovery and/or disposal of waste and legal and natural persons which export non-hazardous waste (OG No. 51/06)
- ✓ Ordinance on the criteria, procedure and manner of determining compensation to real estate owners and local self-government units (OG No. 59/2006)
- ✓ Ordinance on waste batteries and accumulators management (OG No. 133/06)
- ✓ Ordinance on end-of-life vehicles management (OG No.136/06)
- ✓ Ordinance on waste management (OG No. 23/07)
- ✓ Ordinance on the manner and procedures for the management of waste containing asbestos (OG No. 42/07)
- ✓ Ordinance on the manner and requirements for thermal processing of waste (OG No. 45/07)
- ✓ Ordinance on medical waste management (OG No. 72/07)

- ✓ Regulation on control of shipments of waste (OG No. 69/06 and 17/07)
- ✓ Ordinance on waste oil management (OG No. 124/06)
- ✓ Ordinance on waste electrical and electronic equipment management (OG No. 74/07)
- ✓ Ordinance on waste oil management (OG No. 124/06)

In addition, certain waste management aspects are regulated by other sectorial legislation and international agreements:

- ✓ Environmental Protection Act (OG No. 82/94 and 128/99)
- ✓ Act on Public Utilities (OG No. 26/03, 178/04)
- ✓ Act on Ratification of Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and their Disposal (OG – International Treaties No. 3/94)
- ✓ Air Protection Act (OG No. 178/04)
- ✓ Regulation on Limit Values of Emission Pollutants from Stationary Sources into the Air (OG No. 21/2007)
- ✓ Act on Environmental Protection and Energy Efficiency Fund (OG No. 107/03)
- ✓ Physical Planning Act (OG No. 30/94, 68/98, 35/99, 61/00, 32/02 and 100/04)
- ✓ Maritime Act (OG No. 181/04)
- ✓ Maritime Domain and Ports Act (OG No. 158/03 and 141/06)
- ✓ Act on Ratification of United Nations Framework Convention on Climate Change (OG - International Treaties No. 2/96)
- ✓ Kyoto Protocol to the United Nations Framework Convention on Climate Change (OG - International Treaties No. 5/07)
- ✓ Montreal Protocol on Substances that Deplete the Ozone Layer (OG – International Treaties No. 12/1993)
- ✓ Stockholm Convention on Persistent Organic Pollutants (OG – International Treaties No. 11/2006)
- ✓ International Convention MAR POL 73/78, i.e. Protocol V which regulates waste disposal in ports
- ✓ Barcelona Convention (OG – International Treaties No. 12/1993 and 17/1998)

Foundations are formed on the:

- Waste Act (http://narodne-novine.nn.hr/clanci/sluzbeni/2013_07_94_2123.html)
- Environmental Protection Act (http://www.mvep.hr/zakoni/pdf/339.pdf)
- Air Protection Act (http://www.mvep.hr/zakoni/pdf/339.pdf)
- Law on Environmental Protection and Energy Efficiency Fund
- Law on Physical Planning, Law on Utility Services, Maritime Law
- Law on Maritime Domain and Ports
- Ratification of Basel Convention
- Kyoto Protocol on Climate Change, Montreal Protocol
- Stockholm Convention

- International Convention MAR POL 73/78, i.e. the Protocol V regulating waste disposal in ports
- Barcelona convention
- **Waste Management Strategy of the Republic of Croatia**
  (OG No. 130/05) http://narodne-novine.nn.hr/clanci/sluzbeni/289920.html
- **Waste Management Plan of the Republic of Croatia for 2007-2015**
  (OG No. 85/07) http://narodne-novine.nn.hr/clanci/sluzbeni/2007_08_85_2652.html
- **Waste Act**
  (OG No. 178/04) http://www.mvep.hr/zakoni/pdf/715.pdf

- Other regulations: http://mzoip.hr/hr/otpad/propisi-i-medunarodni-ugovorixx.html

All regulations can be found in http://www.azo.hr/Default.aspx?art=996&sec=536 and on http://www.lexadin.nl/wlg/legis/nofr/eur/lxwecro.htm

7. Waste Projects

7.1 Croatia National Strategy for Solid Waste

The project aims to build broad consensus among key stakeholders about the best policy mix for Croatian municipalities to achieve compliance with the EU waste framework requirements. The strategy served as a basis for Waste management plan.

WASTE MANAGEMENT IN CROATIA – PLANS AND OBLIGATIONS IN NEAR FUTURE
The main task behind the plan is the implementation of the main goals of the strategy set for the period between 2005 and 2025:

- Establishment of an integrated waste management system
- Remediation and closure of the existing landfills
- Remediation of the "black spots"
- Development and establishment of regional and county waste management centres
- Establishment of complete computerization of the waste management

Plans in waste management for the period 2007-2015 specially define the following:

- First selection – managements of special waste categories (example is very well developed recycling system in Croatia)
- Building of waste management centres on county/regional level (already started through ISPA and IPA Funds)
- Remediation of landfill (out of 300 landfills in Croatia, remediation is started on around 70 of them)
- Remediation of black spots (currently 1 in process)

As Croatia is now a part of EU, there are opportunities of financing from EU Funds for the following:

- Mechanical biological processing
- Transporter units

- Remediation of landfills

Key postulates for the preparation of those projects are:

- Physical plans – undefined locations
- Land ownership
- Infrastructure – roads, electricity, water and sewage
- Project documentation in the process of Public Procurement
- Insurance of the funds for project documentation (60% from the Fund for Environmental Protection and 40% from the local government unit) – per contract with the Fund for Environmental Protection
- Contract between county and unit of local governance
- Necessary cooperation, organization and contracting with the Fund for Environmental Protection
- The establishment of utility companies at county level

Croatia is expecting the building of waste management centres and remediation of existing ones to be finalized by 2018.

Currently, through the Ministry of Environment and Nature Protection, the Croatian government has set plans for the following waste management centres:

- 3 are in the process of construction or in the process of construction preparation (Bikarac, Mariscina, Kastijun)
- 3 are in the project phase and/or in process of application preparation (Lecevica, Zadar, Piskornica)

Opportunities

Life program is a European Commission Program which aims at preserving development and implementing innovations related to preserving the environment, i.e. waste management, biodiversity preservation, circular economy and air quality. Croatia got the opportunity to use 155 million Kuna from the fund for the projects related to environment and climate protection http://www.mzoip.hr/hr/ministarstvo/vijesti/hrvatskoj-do-2017-za-projekte-zastite-okolisa-i-klime-kroz-life-program-na-raspolaganju-oko-155-milijuna-kuna.html .


WATER
MANAGEMENT
IN CROATIA

8. Water management in Croatia

Water receives special attention in Croatia. According to the Croatian Water (Hrvatske vode – www.voda.hr) , water management "is the total of deliberate and organized activities of different people aimed at the preservation, rational use and control of water, essential for survival on the earth". It also consists of a group of activities, decisions and measures meant for the purpose of maintenance, improvement and establishing of the integrity of the water regime in a given area, which is achieved in particular by providing the required quantities of water of adequate quality for various purposes, by protection of water against pollution, regulation of watercourses and other water bodies, and by protection from adverse effects of water.

The term "water management" denotes immediate the execution and the organization of the execution of tasks related to the provision of required water quantities, protection of water from pollution, the regulation of watercourses and other water bodies, and the protection from adverse effects of water, not including the tasks carried out by government bodies and local self-government and government units.

The basic source for water use in Croatia is surface water, followed by groundwater and marginal quantities of desalinized water.

8.1 Water Management Principles

Water management ***www.voda.hr***
www.mps.hr (Ministry of Agriculture)

In the water sector the data used in the EPOP relies on several data sources: the National Water Management Strategy (2007-2015), MAFWM (Ministry of Agriculture, Forestry and Water Management), Croatian Water, the Croatian Central Bureau of Statistics (Statistical Yearbooks) and EUROSTAT. The data collection system in the water sub-sector in Croatia has also to be improved on the basis of the existing legal framework.

The environment sector and environmental policy correspond to the national level, rather than regions, and the data provided in the EPOP refers to the national level (NUTS I).

For water management purposes, Croatia's territory is divided into 4 water basins and 34 catchment areas. The water basin comprises one or more catchment areas of major river watercourses, or parts thereof, constituting a natural hydrographical entity. The catchment area comprises, within a water basin, one or more catchments of minor watercourses for which integrated water management is provided. With respect to interconnected problems, existing water system and economic conditions,

8.2 Water Use

Water use implies the following:

- Abstraction, pumping and use of surface water and groundwater for various purposes (drinking water supply, sanitary and technological purposes, irrigation, etc.),
- Use of water power for production of electricity and other similar purposes,
- Use of water for fish-farming,
- Use of water for navigation,
- Use of water for sports, bathing, recreation and other similar purposes.

Water Supply

The use of water for the supply of population with drinking water, sanitary purposes, fire protection and defence has absolute priority over water use for other purposes.
The water supply activity consists of abstraction and pumping of groundwater and surface water for drinking and other purposes, treatment of water to the level of health standard, transport to the place of consumption, and distribution to consumers.

The quality of water for water supply must comply with the conditions defined by the Regulation on Water Classification and other conditions prescribed by the law or bye-laws.

Use of water for ameliorative irrigation

Abstraction and use of water from watercourses and other surface water bodies, pumping of groundwater and collecting rainwater for irrigation of agricultural and other land (ameliorative irrigation) is carried out in the manner and under the conditions defined by a water rights permit and a concession contract.
For the purpose of construction and use of ameliorative irrigation systems of interest to several landowners or land users, co-ops may be established.

The professional supervision of these issues is performed by *Hrvatske Vode* (www.voda.hr) .

Use of water power

The right to use water power for production of electricity and for devices driven by water power is awarded on the basis of a concession contract and a water rights permit.

The basic principle in making the decision on awarding the right to use water power is the principle of greater public interest (improvement of the general standard of living, environmental protection, health protection, etc.), and a more rational use of water power.

Water structures and plants for the use of water power may be designed and constructed to comply with the following requirements:

- They shall allow returning of water into the watercourse or other water body;
- They shall not reduce the existing extent of water use for water supply, irrigation and other purposes, and they shall not obstruct water use for other purposes defined by plans;
- They shall not reduce the level of protection from adverse effects of water, nor impede implementation of such protection measures;
- They shall not deteriorate the health conditions nor affect adversely the condition of the environment;
- They shall not cause damage to forests and other flora and fauna, nor to property and legal interests of other persons;
- They shall not impede pedestrian, road and railway traffic, or inland navigation.

If storage reservoirs for water power use are constructed, it is imperative to ensure their multipurpose character, in particular regarding protection from floods and other adverse effects of water and provision of water for water supply, irrigation and other purposes.

Wastewater Treatment Systems & Sewage Systems used in Croatia

Wastewater treatment systems used in Croatia

- Mechanical
- Biological
- Membrane
- Plant Lagoon

Sewage systems

- Mixed
- Separate

The typical sewage system is mixed (faecal and precipitation waters together). Only a few smaller cities and residential districts of bigger towns have separate or split sewage systems (faecal and precipitation waters are split)

9. Legal Framework

The legal foundations of water management in Croatia are defined by the Constitution of the Republic of Croatia, the Water Act, the Water Management Financing Act and their bylaws, with individual provisions related to water found also in several other laws which regulate other legal areas. The Constitution of the Republic of Croatia defines water a resource of particular interest for the Republic of Croatia and guarantees it special protection.

The primary legislation for **water management** consists of two acts:

- The Water Act, (OG No. 107/95 and 150/05); and
- The Water Management Financing Act, (OG Nos. 107/95, 19/96, 88/98 and 150/05).

The Water Act regulates and defines the legal status of water and water estate, the preconditions for their use and protection, and the activities and organization of water management. The Water Management Financing Act defines water management revenues, the most significant of which are water charges.

In addition to these two acts, representing the fundamental legal framework, water management in the Republic of Croatia is regulated by approximately 40 subordinate acts. The existing legal framework for water management needs to be harmonized with the EU *Acquis;*

Relevant for this EPOP are:

- ✓ Regulations on special requirements to be met by legal persons carrying out waste water activities
- ✓ Regulations on special requirements for carrying out water supply activities
- ✓ Regulations on the sanitary quality of drinking water
- ✓ National water protection plan
- ✓ Regulations on the issuance of water rights acts
- ✓ Regulations on the development of the water management master plan of the Republic of Croatia
- ✓ Regulations on the establishment of sanitary water source protection zones
- ✓ Regulation on water classification
- ✓ Regulations on limit values of indices, hazardous and other substances in waste water
- ✓ Decision on determining catchments areas
- ✓ Decision on the register of national waters
- ✓ Decision on determining the boundaries of river basins
- ✓ Regulation on hazardous substances in water
- ✓ Ordinance on water-related documentation

Croatia has signed and ratified a number of international water management treaties, these include:

- The Convention on the Protection and Use of Trans-boundary Waters and International Lakes (OG – International Treaties No. 4/96);
- The Convention on Co-operation in the Protection and Sustainable Use of the Danube River (OG – International Treaties No. 2/96)
- The Framework Agreement on the Sava Catchment Area (OG – International Treaties No. 14/03).

There are also important bilateral agreements on water management co-operation signed with the Republic of Hungary, the Republic of Slovenia and the Republic of Bosnia and Herzegovina.

10. Institutional Framework

Water management responsibilities in Croatia are divided between the following institutions:

The water management activities in Croatia are divided into: legal (competence of the Croatian Parliament and the Government of the Republic of Croatia), administrative (competence of the Ministry of Agriculture, Forestry, and Water Management – Water Management Directorate, and other units of State and local and regional authorities), and operative water management activities (competence of Croatian Waters).

The **Croatian parliament** and the **Government of the Republic of Croatia** are State Authority Bodies. The Parliament adopts the relevant legislation and national strategies, such as the Water Management Strategy. A Parliamentary committee issues opinions on specific acts and documents. The Government adopts the river basin district management plans and proposes relevant legislation and strategies to Parliament.

The Ministry of Regional Development, Forestry and Water Management is the primary agent of administrative, legal, and professional activities of implementation of the water management policy ensuring:

- Preparation of acts and other regulations, international and bilateral contracts and agreements
- Implementation of acts and regulations, international and bilateral contracts and agreements
- Compliance of regulations with the regulations of the European Union
- Monitoring and analysis of the state and coordination of water management development with the requirements of economic development
- Development of water management plans
- Protection of water and sea from pollution from land-based sources
- Planning and coordination of development of public water supply and sewerage systems
- Establishment, monitoring and improvement of the water information system and document management
- Administrative and professional supervision of water management activities of Croatian Waters and water management bodies of county and local/regional authorities

Under the Ministry of Agriculture, Forestry and Water Management (MAWFM) two directorates relevant to water management have been established and are also responsible for water policy in the Republic of Croatia: the Directorate for Water Management and the Directorate for Water Policy and International Projects. The Directorate for Water Policy and International Projects is responsible for affairs related to EU accession, and implementation of internationally funded projects in the water sector.

Hrvatske Vode / Croatian Waters (www.voda.hr) is the legal entity for water management in Croatia.

Hrvatske Vode / Croatian Waters is a public institution founded by the Republic of Croatia. It is run by a Management Board and a general manager, both appointed by the Government of the Republic of Croatia.

As distinguished from budgetary funding, Hrvatske Vode / Croatian Water provides direct expert, technical, economic, and legal assistance to municipal users in defining, preparing, and implementing projects of varying complexity. Hrvatske Vode / Croatian Water spend allocated funds on the basis of water management plans.

Hrvatske Vode / Croatian Water perform water management activities as a public service and is part of the third level of public administration. The first level is the Government of the Republic of Croatia. The second level consists of ministries and state administration organizations. The third level consists of public institutions, public-right organizations, and companies which perform public service and whose major shareholders are the state, counties, towns/cities or municipalities. Activities related to regulation, inspection and appeal in the field of water management are conducted by the Ministry of Agriculture, Forestry and Water Management, positioned on the second level of the public administration. A special role in water management rests with the National Water Council, a body appointed by Croatian Parliament. It discusses legislation, financing system, the Water Management Master Plan, and the needs arising in various areas of life in connection with the water system.

. The tasks performed by Croatian Waters are as follows:

- Preparation of the draft Water Management Strategy, draft river basin district plans and preparation and implementation of the water management plan;
- Preparation of terms of reference, concept solutions, studies and investment programs and reviewing of designs;
- Regulation of watercourses and other water bodies and ensuring protection from the adverse effects of water - monitoring of the situation and the control of watercourses and other water bodies, organization of protection from floods and ice, protection from erosion and torrents, the organization of the construction, technical and economic maintenance of watercourses and water works;
- Management of ameliorative irrigation and drainage systems - organizing their construction, maintenance and utilization;
- Water use - determining water resources, monitoring the status of water resources, adjustment of water use plans made by other legal entities and the monitoring of their implementation, and other measures for functional and rational water use;
- Water protection - monitoring and determining water quality, organizing the implementation of the National Water Protection Plan, coordination of water protection plans of local administrative units and other plans for investment in water protection, and monitoring their implementation, measures for prevention and elimination of water pollution;
- Management of the public water estate;
- Keeping water-related documentation and managing the integrated water information system;
- Technical operations related to awarding concessions on water and public water estate;
- Supervision of the implementation of terms and conditions stipulated by water rights acts and concession agreements (water management supervision);
- Tasks related to the implementation of water management plans;
- Supervision of the construction of water works.

Croatian Waters' responsibility covers the whole of Croatia through its five water management offices and 32 catchment areas. Croatian Waters is accountable for their work to the competent Ministry, i.e. the Ministry of Regional Development, Forestry and Water Management.

Ministry of Sea, Transport, and Infrastructure) **http://www.mppi.hr/** – performs administrative, professional, and other activities related to the organization of strategic infrastructure projects and investment programs of special importance to the Republic of Croatia (water supply, wastewater sewerage, etc.) which are entirely or partially financed from the State Budget, coordinates the activities of other subjects in the construction of such facilities, monitors and controls the investments, and performs professional activities related to the commencement, coordination, and monitoring of activities regulated by acts and regulations that govern the development of islands.

At a **local level**, there are a relatively large number (143) of **municipal companies** responsible for public water supply in Croatia; similarly, public wastewater systems are managed by 130 **public utility (municipal) companies**, some of which are also responsible for water supply. The owners of these companies are local self-government units.

11. Current status and opportunities in Water Management Sector

Household wastewater disposal falls under the administrative competence of the local government authorities (municipalities). All major Croatian towns have a sewage system for the collection of municipal wastewater in place; wastewater treatment plants are present and functioning to varying degrees. Studies of Croatian Waters (Hrvatske Vode, www.voda.hr) describe the current situation and the needs for the development and construction of wastewater treatment facilities in Croatia. In the process of achieving EU standards in the field of household wastewater treatment, additional funds need to be raised and allocated.

Industrial wastewater treatment and the condition of treatment plants are not at the same level of development in the Croatian industry.
Major companies have more developed wastewater treatment facilities, but the majority of industry lacks the necessary funds for investments in modern equipment. In this field, future investments in the development and construction of equipment in accordance with EU standards will be needed.

Priorities of the Croatian Government and plans for development and construction of
Wastewater treatment plants have not been defined entirely yet but they will be completed in the process of accession to the EU and harmonized with EU standards.

12.Competition and Market Demand

German, Austrian and French companies have a long history of cooperation with the Republic of Croatia in major infrastructure projects. The market demand consists on water pumps, separators, pipes, filters, bio-filters, sludge treatment equipment

13. Domestic sources

The Act on Financing Water Management regulates the sources of funding for activities within the water management system, the manner of determining individual responsibility and collection of charges, and other issues concerning the allocation of funds. As water and wastewater projects are strategic capital investments, it is necessary to provide partial financing from the national budget and the budgets of units of local self-government, from other domestic sources and from abroad. To this end, Croatian government established **The Environmental Protection and Energy Efficiency Fund** (www.fzoeu.hr) in 2004.

The Fund was established to finance the preparation, implementation and development of programs, projects and similar activities concerned with the preservation, sustainable utilization and improvement of the environment, as well as with energy efficiency and the use of renewable sources of energy. The Fund grants money to legal entities and persons for programs, projects and other activities as defined in the Environmental Protection and Energy Efficiency Fund Act.
The financing takes the form of loans, subsidies, financial aids and grants. The funds are distributed on the basis of invitations for proposals. The Fund resources for financing of projects and programs are collected from permanent sources, i.e. the charges and contributions paid by the polluters and users of environment, interest on loans, donations, money from international bilateral and multilateral co-operation in onshore joint ventures, as well as the revenues from the national budget, budgets of the local self-government and local administration and self-government units for specific programs and purposes, from donations, service fees, sales of shares, equity capital, rights and things owned by the Croatian Privatization Fund i.e. the Republic of Croatia and from other sources.

Croatian Waters (www.voda.hr), a public utility company, plays a very important role in financing water supply, sewage and wastewater treatment projects. There is a series of public revenues from waters, i.e. water management contribution, charge on water use, charge for water protection, charge for sand and gravel extraction, basin water management charge, and a special charge investing in land improvement and drainage systems (to local authorities). The wastewater and sewage non-compliance fees are imposed for non-compliance with the conditions prescribed to protect water against pollution.
All water charges are collected by the water agency, Croatian Waters. The overall revenue from these charges is around 70 per cent of Croatian Waters total revenues.

Water management is the second priority in Croatia, after waste management.
Croatia needs to protect water resources by advancing water supply systems and waste water management, as a whole, by the following measures:

- Establishment of water supply systems and networks
- Building of installations for waste water purification from households and industry; as well as improvement of existing sewage

Projects in implementation:

1. Project Meandar – http://www.voda.hr

2. Project Twinning - http://www.voda.hr

* Projects Meander and Twinning - When you press on the link, please go on PROJEKTI and press MEĐUNARODNI PROJEKTI.

3. Project – Municipal water financing facility (http://fvki.voda.hr/home.html)

4. Jadran project (http://old.voda.hr/jadranskiprojekt-o-projektu)

(http://www.voda.hr/hr/jadranski-projekt)

The Jadran (Adriatic) project is a multiannual project whose goal is to protect water from contamination. The International Bank for Reconstruction and Development (IBRD) is involved and supports this project. The Project will act in: Cres, Krk, Lošinj, Medulin, Novigrad, Opatija, Pula, Rab, Rijeka-Grobnik, Kaštelir, Zadar, Betina,-Murter, Dugi Rat, Hvar, Metković, Mljet, Sukošan-Bibinje, Vela Luka and Dubrovnik.

For further information regarding this project please use the links provided. Projects are not in English, but you can translate them by using Google translation (translation from Croatian into English is rather good).

Moreover, you may be interested in the Croatian Water Pollution Control Society (http://www.hdzv.hr/).

USEFUL LINKS

Croatian Waters - www.voda.hr

MINISTRIES:

Ministry of Agriculture- www.mps.hr
Ministry of Environmental Protection and Nature Protection – www.mzopi.hr
Ministry of Construction and Physical Planning – www.mmtpr.hr
Ministry of the Sea, Transport and Infrastructure- http://www.mppi.hr/
Ministry of Regional Development, Forestry and Water Management- www.mrrsvg.hr

Croatian Environment Agency - www.azo.hr

Information System for Environmental Protection of the Republic of Croatia-
http://iszo.azo.hr/

Environmental protection and energy efficiency Fund - www.fzoeu.hr

Operational programme competitiveness and cohesion 2014-2020; support for alignment with the EU environmental acquis-
http://ec.europa.eu/regional_policy/hr/atlas/programmes/2014-2020/Republic%20of%20Croatia/2014hr16m1op001

PDF: Strategy for Sustainable Development of the Republic of Croatia
http://www.mzopu.hr/doc/Strategy_for_Sustainable_Development.pdf

A branch of Zagreb Holding (company that handles all public services a.o. water) deals with waste management- http://www.cistoca.hr/

Agency for Inland Waterways – www.vodniputovi.hr
Agency for Inland Waterways is a public institution, and non-profit legal entity with rights and obligations determined by the shipping and inland water ("Official Gazette" No. 109/2007 and

132/2007) and the Regulation on the management and administration of the Agency for Water paths ("Official Gazette" No. 58/2008).

Also you may be interested in the Catalogue of companies engaged in environmental protection activities. Main activities within this catalogue represent waste collection and management, recycling, environmental services, production of equipment and machinery, their instalment as well as other related services.

http://www.hgk.hr/wp-content/blogs.dir/1/files_mf/katalog_zo_2013_web66.pdf

Recent projects

http://mzoip.hr/doc/katalog_otpada_-_smjernice_za_koristenje_priloga_iii-v_uredbe_ez_10132006_o_otpremi_posiljaka_otpada.pdf - waste catalog realized in association with IPA

http://www.mzoip.hr/hr/ministarstvo/vijesti/prvi-centar-za-gospodarenje-otpadom-u-hrvatskoj-mariscina-krece-s-probnim-radom.html - press release on probation work of Marišćina is the first waste management centre in the Primorsko-goranska County

http://www.kastijun.hr/index.php?option=com_content&view=article&id=20&Itemid=10&lang=en - article on Kaštijun County Waste management centre, financed mostly from EU funds, the opening is scheduled for August 2015

http://www.mzoip.hr/hr/ministarstvo/vijesti/raspisan-javni-natjecaj-za-izvodace-radova-na-gradnji-cgo-a-biljane-donje.html - press release on call for tender for contractors of waste management centres Biljane Donje, Piškornica and Bikarac

Laboratories of Waste

http://www.azo.hr/PopisLaboratorijaKoji - list of laboratories accredited for chemical analyses in Croatia